Right Bundle Branch Block Evolves to Ischemic Myocard in Patient with Chronic Back Pain: A Case Report

Meity Ardiana¹ and Inna Sufiyah¹

¹Airlangga University Faculty of Medicine

January 11, 2023

Abstract

A male was admitted for middle back pain a month prior and became heavier in a week. The patient came to the emergency room of a hospital and the ECG showed complete RBBB. After Day-3 inpatient, the chief complaint was worsening and ECG showed ischemia sign of infero-anterolateral.

Introduction

A right bundle branch block (RBBB) is characterized by a lengthening of the QRS duration more than 120 ms and an rsr', rsR', or rSR' pattern in the lead of the right chest V1 or V2. A review of the published literature finds a dearth of articles on how to interpret Electrocardiography (ECG) abnormalities caused by an infarct or an ischemic event when there is a right bundle branch block⁴. It only show about 6% in Myocard Infarction⁵. Meanwhile, European Society of Cardiology latest guideline describing RBBB as a high risk for mortality in patients with suspected myocardial infarction⁶.

Back pain is a rare complaint in patients with suspected coronary disease. According to certain research, the severity of back pain and the mortality rate are correlated with coronary heart disease⁷. This case report would present a patient with back pain symptoms and RBBB on ECG but progressively become MI.

Case Presentation

A 77 years old male was admitted for middle back pain for a month prior and became heavier in a week. He had recurrent middle back pain described the pain as feeling of heavy pressure in the mid back, sometimes it spread to the back of the epigastric. The patient had a lumbar photo examination (Figure 1) and received oral NSAID analgesic therapy but did not improve. He felt fatigue in 2 weeks prior, without chest pain, dyspnea, palpitation, perspire, nausea, and vomiting. The medical history includes having Hypertension and Diabetes Mellitus since 20 years ago, taking medication regularly of anti-Hypertension drugs Amlodipin 10mg, oral antidiabetic Metformin and Glimepiride. The patient denied any other history of coronary heart disease, or kidney disease. Now he is 5 years after quitting smoking and never drank.

The patient came to the emergency room of a hospital and the ECG showed QS pattern at II, III, AVF impressed an Old Myocard Infarction (OMI) inferior, complete RBBB and 1st degree AV-Block (Fig. 2A). He felt his back pain didn’t relieve with analgetic injection t.i.d and the day-3 inpatient, the chief complaint was burdensome. Back pain is so worse that the patient cannot sleep on his back. The ECG of Day-3 inpatient showed new deep arrow-head T inverted at V3-V6; II, III, AVF impressed ischemia sign of infero-anterolateral, OMI inferior, complete RBBB and 1st degree AV-Block (Fig. 2B). Hence, the patient was referred to our hospital which has a Percutaneous Coronary Intervention (PCI) facility.

In the emergency room of our hospital, as the referral hospital, we did re-measure the vital signs. His blood pressure was 120/82 mmHg, heart rate of 79 beats per minutes (60-100 beats per min), respirations rate...
at 18/min (12-20/min), oxygen saturation of 98% of free air (95%-100%). His body weight: 56kg, height 170cm (BMI=19.3). There were no positive physical examination findings. All other laboratory values were within normal range except for white blood cell (WBC) 13.55x10^3/uL (3.37-10.0 x10^3/uL), neutrophil 81.2% (39.8%-70.5%), and cardiac marker Hs-Troponin I 996.5 (<35).

We did re-examination of ECG (Figure 2C) and there was no improvement of the ECG, showing persistent deep arrow-head T inverted in lead II, III, avF, V3-V6, OMI inferior, complete RBBB, 1st degree AV Block. There was also decrease of left ventricular systolic function (EF by TEICH 46%), and 3rd degree of left ventricular diastolic dysfunction in echocardiography results. Hence, he underwent urgent coronary angiography.

The coronary angiography (Figure 3) revealed 95% critical stenosis in left circumflex (Lcx) coronary artery, 30% stenosis in mid left anterior descending (LAD) coronary artery, and non-significant stenosis 30% in mid right coronary artery (RCA).

The patient was subsequently managed with Primary Percutaneous Coronary Intervention (PPCI) due to NSTE-ACS high risk (CAD SVD + Critical stenosis 95% at distal of Lcx artery) TIMI Flow III treatment. The stent placement is done, and the patient complaint of heavy pressure on his back pain is improved dramatically during his following admission.

Discussion

This patient’s case was a rare life-threatening and unpredictable case. An elderly, 77 years old, with comorbidities of hypertension and diabetic, came to the ER with feeling heavier pressure on his middle back pain for a month and become heavier in a week, and sometimes spreading to the back of his epigastric. He had received NSAID analgesic therapy but did not improve. The lumbar Xray which depicting spondylolithesis of lumbar vertebra 4-5. Interestingly, his chief complaint was frequently so-called “atypical” symptoms of myocardial infarction (MI)[5], proven by his ECG changes, improved symptoms after he got coronary angiography that revealed 95% critical stenosis in left circumflex (Lcx) coronary artery, 30% stenosis in mid left anterior descending (LAD) coronary artery, and non-significant stenosis 30% in mid right coronary artery (RCA).

Studies indicated that symptoms labeled as “atypical” pain in MI likelihood got delayed treatment and poorer outcome. Atypical pain is frequently defined as epigastric or back pain or pain that is described as burning, stabbing, or characteristic of indigestion[5]. Whereas typical symptoms usually include chest, arm, or jaw pain described as dull, heavy, tight, or crushing. DeVon et al[5] propose to discontinue using the terms typical and atypical symptom assessment for MI so that proper and rapid diagnostic testing can be undertaken.

The ECG findings of this patient was an evolution of ischemia sign. First day of ECG showed OMI inferior, complete RBBB, and 1st degree AV Block. The nightmare started on the 3rd day of inpatient, the ECG start to emerge T-wave inverted in II, III, AvF, V3-V6. The patient referred to our hospital due to the progression of ischemic ECG and heavier symptoms to get the PCI facility. When we noticed it, it was not only a sign of a new inferior anterolateral ischemia. According to Cooper at al[1], the upright T-waves in V1 may suggest posterior ischemia. Widinsky et al[6], termed the upright T-waves in right precordial leads “pseudo-normalization” of T-waves, an ominous sign of infarct when inverted t-waves dynamically become upright. The upright T-waves in V1-V2 in conjunction with the right bundle branch block (RBBB) as a “mirror-image” of inverted T-waves in posterior leads V7-V9. It also can as be represented isolated lateral myocardial infarction (LMI), with the circumflex artery which is usually responsible for artery of infarction[7]. Life-threatening MI might be missed when RBBB is present, and the present of RBBB should be able to predict a proximal right coronary artery lesion[1].

Right bundle-branch runs in the interventricular septum, and the blood supply is the left coronary circulation[8], mostly provided by the first septal branch separated from LAD. Therefore, new-onset RBBB is likely caused by proximal occlusion of LAD[9]. Beside the LAD artery, the right bundle-branch also receives
collateral circulation from the right or left circumflex coronary arteries\textsuperscript{[10]}. The 12-lead ECG is particularly insensitive for Lcx artery occlusion because of the absence of lateral precordial leads and the late depolarization of the lateral wall\textsuperscript{[11]}. Interestingly, in our case, coronary angiography revealed that the culprit artery is the Lcx artery rather than LAD artery.

Myocardial infarction (MI) can cause direct cellular damage to the right bundle branch. Yet increased right intraventricular pressure, chronically as in cor pulmonale, can stretch the right bundle branch causing a bundle branch block. Right bundle branch block is generally a slowly progressive degenerative disease of the myocardium\textsuperscript{[10]}.

The patients with new-onset RBBB may need more attention. Studies\textsuperscript{[9]} have shown RBBB may mask the early diagnosis of ST-elevation MI. Moreover, new-onset RBBB is occasionally caused by AMI. Thus, a number of patients with ischemic symptoms and new-onset RBBB may suffer from STEMI. The presence of RBBB was a significant independent predictor of poor prognosis, including higher rate of acute heart failure, complete heart block, and the need for a permanent pacemaker, as well as higher in-hospital mortality\textsuperscript{[8,10]}. A new RBBB is likely to have a higher incidence of cardiogenic shock and increased long-term mortality\textsuperscript{[9]}.

Non-STEMI and acute coronary occlusion had mean delay >24 hours to get PCI\textsuperscript{[11]}. Different treatment to careful handling of RBBB and the presence of ischemic sign in ECG an upright T-wave in V1. Cooper et al\textsuperscript{[1]} took their patient whose ECG revealed RBBB and upright T-wave in V1 (as a “mirror-image” of inverted T-waves in posterior leads V7-V9), with cardiac catheterization which revealed 80% stenosis of the distal left main artery, 60% stenosis of mid-left anterior descending artery, and 95% stenosis at the ostium of the right coronary artery. One day after catheterization, the patient went to coronary artery bypass grafting (CABG); Manzur-Sandoval et al took their patient as a non-reperfused MI with RBBB. The coronary angiography showed TIMI (Thrombolysis in Myocardial Infarction) flow scale of 0 at the proximal segment of circumflex artery, and the patient taking initial management Aspirin 300mg, Clopidogrel 300mg, unfractionated heparin 4000IU, Atorvastatin 80mg. Whereas 2017 European Society of Cardiology guidelines for acute MI management said that it may be difficult to detect transmural ischaemia in patients with chest pain and RBBB. Myocardial infarction (MI) and RBBB have a poor prognosis. Hence, primary PCI strategy needed to consider when the persistent ischemia symptoms in conjunction with RBBB on ECG pattern\textsuperscript{[12]}. 

**Conclusion**

To be a clinician it’s a challenge to recognize and be careful with patients’ complaints even if they are admitted to such “atypical” pain of MI, especially if they have a history of metabolic syndrome. With ECG changes, we need to pay attention to, neither underestimate nor ignore the presence of RBBB due to it appearance is also likely a tricky-hidden and may contribute to life-threatening occlusion of left coronary artery. Therefore, to date it’s consider the need for RBBB with symptom cases to have an indication of reperfusion.

**References**


6. Widimsky P, Rohac F, Stasek J. Primary angioplasty in acute myocardial Infarction with right bundle branch block: should new onset right bundle branch block be added to future guideline as an indication for reperfusion therapy? Eur Heart J 2012;33:86-95


Hosted file